

Amendment to the Claims:

Please amend the claims as follows:

Please cancel claims 34, 37 and 47 to 80, without prejudice or disclaimer.

This listing of claims will replace all prior versions and listings of the claims in the application:

Listing of Claims:

Claim 1 (currently amended): A recombinant expression system comprising a host cell comprising a nucleic acid encoding a phytase enzyme

(i) having the amino acid sequence as set forth in SEQ ID NO:2, [[or]]

(ii) having an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432;

(iii) having the amino acid sequence as set forth in SEQ ID NO:2 comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence,

(iv) having an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432 comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence, or

(v) having the amino acid sequence of (i), (ii), (iii) or (iv) and further comprising a sequence imparting a desired characteristic,

wherein the nucleic acid is operably linked to a transcription control sequence.

Claim 2 (currently amended): A vector comprising a nucleic acid

(i) comprising a nucleotide sequence as set forth in SEQ ID NO:1,

(ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296,

(iii) comprising the nucleotide sequence of (i) or (ii) further encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence,
or

(iv) comprising the nucleotide sequence of (i), (ii), or (iii), encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432 further comprising a sequence encoding a polypeptide imparting a desired characteristic.

Claim 3 (previously presented): The expression system of claim 1 wherein the transcription control sequence comprises a constitutive promoter.

Claim 4 (previously presented): The expression system of claim 1 wherein the transcription control sequence comprises a tissue-specific promoter.

Claim 5 (previously presented): The expression system of claim 1 wherein said host cell is a prokaryotic cell.

Claim 6 (previously presented): The expression system of claim 1 wherein said host cell is a eukaryotic cell.

Claim 7 (previously presented): The expression system of claim 1 wherein said host cell is a plant cell.

Claim 8 (currently amended): The expression system of claim 1 or 16 wherein the nucleic acid further comprises a heterologous sequence encoding a signal peptide or a transit peptide.

Claim 9 (previously presented): The expression system of claim 8 wherein said signal peptide is a pathogenesis-related (PR) protein PR-S signal peptide from tobacco.

Claim 10 (currently amended): A prokaryotic cell comprising an exogenous nucleic acid encoding a phytase enzyme, wherein the nucleic acid is operably linked to a transcriptional control sequence and the phytase enzyme

(i) is encoded by a nucleic acid comprising a sequence as set forth in SEQ ID NO:1,

(ii) is encoded by a nucleic acid comprising a sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296,

(iii) is encoded by the nucleic acid of (i) or (ii), comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence,

[[(iii)] (iv) comprises an amino acid sequence as set forth in SEQ ID NO:2, [[or]]

(v) comprises an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432,

[[(iv)] (vi) comprises an amino acid sequence ~~of as set forth in~~ (iv) or (v), further SEQ ID NO:2 ~~from amino acid residue 1 to 432~~ comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence,

(vii) is encoded by the nucleic acid of (i), (ii), or (iii) and further comprising a sequence encoding a polypeptide imparting a desired characteristic, or

(viii) comprises the amino acid sequence of (iv), (v) or (vi) and further comprising a sequence encoding a polypeptide imparting a desired characteristic.

Claim 11 (currently amended): A eukaryotic cell comprising an exogenous nucleic acid encoding a phytase enzyme, wherein the nucleic acid is operably linked to a transcriptional control sequence and the phytase enzyme

(i) is encoded by a nucleic acid comprising a sequence as set forth in SEQ ID NO:1,

(ii) is encoded by a nucleic acid comprising a sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296,

(iii) is encoded by the nucleic acid of (i) or (ii), comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence,

[[(iii)] (iv) comprises an amino acid sequence as set forth in SEQ ID NO:2, [[or]]

(v) comprises an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432,

[[(iv)] (vi) comprises an amino acid sequence ~~as set forth in~~ of (iv) or (v), further SEQ ID NO:2 ~~from amino acid residue 1 to 432~~ comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence,

(vii) is encoded by the nucleic acid of (i), (ii), or (iii) and further comprising a sequence encoding a polypeptide imparting a desired characteristic, or

(viii) comprises the amino acid sequence of (iv), (v) or (vi) and further comprising a sequence encoding a polypeptide imparting a desired characteristic.

Claim 12 (currently amended): A cell comprising an exogenous nucleic acid encoding a phytase enzyme, wherein the nucleic acid is operably linked to a transcriptional control sequence and the phytase enzyme

(i) is encoded by a nucleic acid comprising a sequence as set forth in SEQ ID NO:1,

(ii) is encoded by a nucleic acid comprising a sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296,

(iii) is encoded by the nucleic acid of (i) or (ii) comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence,

[[(iii)]] (iv) comprises an amino acid sequence as set forth in SEQ ID NO:2, [[or]]

[[(iv)]] (v) comprises an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432,

(vi) comprises an amino acid of (iv) or (v) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence.

(vii) is encoded by the nucleic acid of (i), (ii), or (iii) and further comprising a sequence encoding a polypeptide imparting a desired characteristic, or

(viii) comprises the amino acid sequence of (iv), (v) or (vi) and further comprising a sequence encoding a polypeptide imparting a desired characteristic.

Claim 13 (currently amended): A method for making a phytase in a cell comprising [[: (a)]] culturing the cell of claim 12 under conditions wherein the ~~exogenous nucleic acid encoding the phytase enzyme~~ is expressed.

Claims 14 to 15 (canceled)

Claim 16 (currently amended): An expression system for making a polypeptide having phytase activity, comprising a host cell and an exogenous nucleic acid, wherein the exogenous nucleic acid codes for the polypeptide having phytase activity and wherein the host cell is capable of expressing the ~~exogenous nucleic acid polypeptide, the exogenous nucleic acid encodes the polypeptide having phytase activity,~~ and the polypeptide having phytase activity

(i) is encoded by a nucleic acid comprising a sequence as set forth in SEQ ID NO:1,

(ii) is encoded by a nucleic acid comprising a sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296,

(iii) is encoded by the nucleic acid of (i) or (ii) and further comprises an amino acid sequence as set forth in SEQ ID NO:2 comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence, or

(iv) ~~comprises an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432~~ is encoded by the nucleic acid of (i), (ii) or (iii) and further comprising a sequence encoding a polypeptide imparting a desired characteristic.

17. (previously presented): The expression system of claim 16, wherein the exogenous nucleic acid is operably linked to a transcriptional control sequence.

18. (previously presented): The expression system of claim 7 wherein said plant cell is a higher plant cell.

19. (previously presented): The expression system of claim 8 wherein the signal peptide is a secretory signal peptide.

20. (previously presented): The expression system of claim 1 or claim 16, wherein the nucleic acid further comprises a promoter sequence, a secretory sequence, a stabilizing sequence, a targeting sequence or a termination sequence.

21. (previously presented): The expression system of claim 1 or claim 16, wherein the nucleic acid is contained in a vector.

22. (previously presented): The expression system of claim 21, wherein the vector comprises at least a portion of a nucleotide sequence taken from a cloning vector, an expression vector, a bacterial vector, a plasmid, a viral particle, a phage, chromosomal DNA, nonchromosomal DNA, synthetic DNA, a vaccinia vector, an adenovirus vector, a fowl pox virus, a pseudorabies vector or a combination of nucleotide sequences thereof.

23. (previously presented): The vector of claim 2, wherein the vector comprises at least a portion of a nucleotide sequence taken from a cloning vector, an expression vector, a bacterial vector, a plasmid, a viral particle, a phage, chromosomal DNA, nonchromosomal DNA, synthetic DNA, a vaccinia vector, an adenovirus vector, a fowl pox virus, a pseudorabies vector or a combination of nucleotide sequences thereof.

24. (previously presented): The eukaryotic cell of claim 11, wherein the eukaryotic cell is a plant cell.

25. (previously presented): The eukaryotic cell of claim 24, wherein the plant cell is a higher plant cell.

26. (previously presented): The eukaryotic cell of claim 24, wherein the plant cell is a seed cell.

27. (previously presented): The eukaryotic cell of claim 24, wherein the plant cell is an edible flower cell, a cauliflower cell, an artichoke cell, a fruit cell, an apple cell, a banana cell, a berry cell, a currant cell, a cherry cell, a cucumber cell, a grape cell, a lemon cell, a melon cell, a nut cell, an orange cell, a peach cell, a pear cell, a plum cell, a strawberry cell, a tomato cell, a leaf cell, an alfalfa cell, a cabbage cell, an endive cell, a leek cell, a lettuce cell, a spinach cell, a tobacco cell, a root cell, an arrowroot cell, a beet cell, a carrot cell, a cassava cell, a turnip cell, a radish cell, a yam cell, a sweet potato cell, a bean cell, a pea cell, a soybean cell, a wheat cell, a barley cell, a corn cell, a rice cell, a rapeseed cell, a millet cell, a sunflower cell, an oat cell, a tuber cell, a kohlrabi cell or a potato cell.

28. (previously presented): The method of claim 13, further comprising converting the cell into a composition suitable for animal feed.

29. (previously presented): The method of claim 13, wherein the cell is a prokaryotic cell or a eukaryotic cell.

30. (previously presented): The method of claim 29, wherein the eukaryotic cell is a plant cell.

31. (previously presented): The method of claim 30, wherein the plant cell is a higher plant cell.

32. (previously presented): The method of claim 30, wherein the plant cell is a seed cell.

33. (previously presented): The method of claim 30 wherein the plant cell is an edible flower cell, a cauliflower cell, an artichoke cell, a fruit cell, an apple cell, a banana cell, a berry cell, a currant cell, a cherry cell, a cucumber cell, a grape cell, a lemon cell, a melon cell, a nut cell, an orange cell, a peach cell, a pear cell, a plum cell, a strawberry cell, a tomato cell, a leaf cell, an alfalfa cell, a cabbage cell, an endive cell, a leek cell, a lettuce cell, a spinach cell, a tobacco cell, a root cell, an arrowroot cell, a beet cell, a carrot cell, a cassava cell, a turnip cell, a radish cell, a yam

cell, a sweet potato cell, a bean cell, a pea cell, a soybean cell, a wheat cell, a barley cell, a corn cell, a rice cell, a rapeseed cell, a millet cell, a sunflower cell, an oat cell, a tuber cell, a kohlrabi cell or a potato cell.

34. (canceled)

35. (currently amended): A vector comprising a nucleic acid

~~(i) comprising a nucleotide sequence as set forth in SEQ ID NO:1;~~

~~(ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296;~~

[[~~(iii)~~]] (i) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2;

[[~~(iv)~~]] (ii) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432,

~~(v) comprising a sequence that is the complete complement of (a) a nucleotide sequence as set forth in SEQ ID NO:1; (b) a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residues 1 to 1296; (c) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; or (d) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432~~

(iii) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 and comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence;

(iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432 and comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence,

(v) encoding a polypeptide comprising the amino acid sequence of (i), (ii), (iii), or (iv), and further comprising a sequence encoding a polypeptide imparting a desired characteristic, or

(vi) a nucleic acid completely complementary to any of steps (i) to (v),

wherein optionally the signal sequence comprises a secretory signal peptide.

36. (currently amended): A cell comprising a vector comprising a nucleic acid

- (i) comprising a nucleotide sequence as set forth in SEQ ID NO:1;
- (ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296,
- (iii) comprising the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence,
- (iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2;
- [[iv]] (v) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432; or,
- [[v]] (vi) encoding the polypeptide of (iv) or (v) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence,

or

- (vi) comprising a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi),

~~(a) a nucleotide sequence as set forth in SEQ ID NO:1; (b) a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residues 1 to 1296; (c) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; or (d) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432~~

wherein optionally the signal sequence comprises a secretory signal peptide.

37. (canceled)

38. (currently amended): A cloning vector comprising a nucleic acid (i) comprising a nucleotide sequence as set forth in SEQ ID NO:1; (ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296, (iii) comprising the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or comprising a heterologous signal

sequence in place of the homologous signal sequence, (iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; [(iv)] (v) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432; (vi) encoding the polypeptide of (iv) or (v) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence; or, [(v)] (vii) comprising a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi), (a) a nucleotide sequence as set forth in SEQ ID NO:1; (b) a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residues 1 to 1296; (c) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; or (d) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432,
wherein optionally the signal sequence comprises a secretory signal peptide.

39. (currently amended): An expression vector comprising a nucleic acid (i) comprising a nucleotide sequence as set forth in SEQ ID NO:1; (ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296, (iii) comprising the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence, (iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; [(iv)] (v) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432; (vi) encoding the polypeptide of (iv) or (v) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence; or, [(v)] (vii) comprising a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi), (a) a nucleotide sequence as set forth in SEQ ID NO:1; (b) a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residues 1 to 1296; (c) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; or (d) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432,
wherein optionally the signal sequence comprises a secretory signal peptide.

40. (currently amended): A bacterial vector comprising a nucleic acid (i) comprising a nucleotide sequence as set forth in SEQ ID NO:1; (ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296, (iii) comprising the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence, (iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; ~~[[iv]]~~ (v) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432; (vi) encoding the polypeptide of (iv) or (v) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence; or, [[v]] (vii) comprising a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi), (a) a nucleotide sequence as set forth in SEQ ID NO:1; (b) a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residues 1 to 1296; (c) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; or (d) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432, wherein optionally the signal sequence comprises a secretory signal peptide.

41. (currently amended): A plasmid comprising a nucleic acid (i) comprising a nucleotide sequence as set forth in SEQ ID NO:1; (ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296, (iii) comprising the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence, (iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; ~~[[iv]]~~ (v) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432; (vi) encoding the polypeptide of (iv) or (v) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence; or, [[v]] (vii) comprising a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi), (a) a nucleotide sequence as set forth in SEQ ID NO:1; (b) a nucleotide sequence as set forth in SEQ ID NO:1 from

~~nucleotide residues 1 to 1296; (c) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; or (d) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432,~~
wherein optionally the signal sequence comprises a secretory signal peptide.

42. (currently amended): A viral particle comprising a nucleic acid (i) comprising a nucleotide sequence as set forth in SEQ ID NO:1; (ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296, (iii) comprising the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence, (iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; ~~[(iv)]~~ (v) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432; (vi) encoding the polypeptide of (iv) or (v) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence; or, [(v)] (vii) comprising a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi), (a) ~~a nucleotide sequence as set forth in SEQ ID NO:1; (b) a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residues 1 to 1296; (c) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; or (d) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432,~~
wherein optionally the signal sequence comprises a secretory signal peptide.

43. (currently amended): A phage comprising a nucleic acid (i) comprising a nucleotide sequence as set forth in SEQ ID NO:1; (ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296, (iii) comprising the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence, (iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; ~~[(iv)]~~ (v) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432; (vi) encoding the

polypeptide of (iv) or (v) further comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence; or, [[(v)]] (vii) comprising a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi), (a) a nucleotide sequence as set forth in SEQ ID NO:1; (b) a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residues 1 to 1296; (c) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2; or (d) the nucleic acid encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432,
wherein optionally the signal sequence comprises a secretory signal peptide.

44. (canceled)

45. (currently amended): A recombinant expression system comprising a nucleic acid encoding a phytase enzyme (i) having the amino acid sequence as set forth in SEQ ID NO:2 comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence, or (ii) having an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432 comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence,
wherein optionally the signal sequence comprises a secretory signal peptide.

46. (currently amended): A method for making a phytase in a cell, wherein the phytase is encoded by an exogenous nucleic acid, comprising culturing the cell under conditions wherein an ~~exogenous nucleic acid encoding~~ the phytase is expressed,

wherein the exogenous nucleic acid (i) comprises a nucleotide sequence as set forth in SEQ ID NO:1; (ii) comprises a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296, (iii) comprising the nucleotide sequence of (i) or (ii) further encodes a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 comprising a homologous signal sequence or comprising a heterologous signal sequence in place of the homologous signal sequence; or (iv) ~~encodes a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from~~

amino acid residue 1 to 432, (iv) comprising a nucleotide sequence as set forth in (i), (ii) or (iii) but lacking a signal sequence, or (v) comprising a nucleotide sequence as set forth in (i), (ii), (iii) or (iv) and a heterologous nucleotide sequence imparting a desired characteristic,
wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 47 to 80 (canceled)

Claim 81 (new): A method for making a phytase in a cell, wherein the phytase is encoded by an exogenous nucleic acid, comprising culturing the cell under conditions wherein the phytase is expressed,

wherein the exogenous nucleic acid (i) encodes a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2, (ii) encodes a polypeptide comprising an amino acid as set forth in SEQ ID NO:2 from amino acid residues 1 to 432, (iii) encodes the polypeptide of (i) or (ii) comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence, (iv) encoding a polypeptide comprising an amino acid sequence as set forth in (i), (ii) or (iii) but lacking a signal sequence, or (v) encoding a polypeptide comprising an amino acid sequence as set forth in (i), (ii), (iii) or (iv) and a heterologous amino acid sequence imparting a desired characteristic,

wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 82 (new): An expression system for making a polypeptide having phytase activity, comprising a host cell and an exogenous nucleic acid, wherein the exogenous nucleic acid codes for the polypeptide having phytase activity and wherein the host cell is capable of expressing the polypeptide,

and the polypeptide having phytase activity (i) comprises an amino acid sequence as set forth in SEQ ID NO:2, (ii) comprises an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432, (iii) comprises the amino acid sequence of (i) or (ii), wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence, (iv) comprises the amino acid sequence of (i), (ii) or (iii) and

further comprising a sequence encoding a polypeptide imparting a desired characteristic, or (v) comprises enzymatically active fragments of (i), (ii), (iii), or (iv),
wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 83 (new): A recombinant expression system comprising a host cell comprising a nucleic acid

(1) (i) encoding a phytase comprising an amino acid sequence as set forth in SEQ ID NO:2; (ii) comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432; (iii) comprising an amino acid sequence as set forth in SEQ ID NO:2, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence; or (iv) comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence,

wherein the phytase sequence of (i), (ii), (iii) or (iv) has at least one conservative amino acid substitution from SEQ ID NO:2, and the conservative amino acid substitution comprises (a) a replacement, one for another, among the aliphatic amino acids Ala, Val, Leu and Ile, (b) an interchange of the hydroxyl residues Ser and Thr, (c) an exchange of the acidic residues Asp and Glu, (d) a substitution between the amide residues Asn and Gln, (e) an exchange of the basic residues Lys and Arg, (f) a replacement among the aromatic residues Phe, Tyr, or (g) any combination of a, b, c, d, e or f; or

(2) a nucleic acid comprising a sequence that is the complete complement of (1);
wherein the nucleic acid is operably linked to a transcriptional control sequence, and the amino acid sequence of the phytase has at least 95% sequence identity to SEQ ID NO:2,
wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 84 (new): A recombinant expression system comprising a host cell comprising

(1) a nucleic acid encoding an enzymatically active fragment of a phytase, wherein the phytase comprises an amino acid sequence as set forth in (i) SEQ ID NO:2; (ii) residues 1 to 432

of SEQ ID NO:2; (iii) SEQ ID NO:2 comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence; or (iv) SEQ ID NO:2 from amino acid residue 1 to 432, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence,

wherein the phytase sequence of (i), (ii), (iii) or (iv) has at least one conservative amino acid substitution from SEQ ID NO:2, wherein the conservative amino acid substitution comprises (a) a replacement, one for another, among the aliphatic amino acids Ala, Val, Leu and Ile, (b) an interchange of the hydroxyl residues Ser and Thr, (c) an exchange of the acidic residues Asp and Glu, (d) a substitution between the amide residues Asn and Gln, (e) an exchange of the basic residues Lys and Arg, (f) a replacement among the aromatic residues Phe, Tyr, or (g) any combination of a, b, c, d, e or f, or

(2) a nucleic acid comprising a sequence that is the complete complement of (1);

wherein the nucleic acid is operably linked to a transcriptional control sequence, and the amino acid sequence of the phytase has at least 95% sequence identity to SEQ ID NO:2,

wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 85 (new): A vector comprising a nucleic acid

(1) (i) encoding a phytase comprising an amino acid sequence as set forth in SEQ ID NO:2; (ii) comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432; (iii) comprising an amino acid sequence as set forth in SEQ ID NO:2, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence; or (iv) comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence,

wherein the phytase sequence of (i), (ii), (iii) or (iv) has at least one conservative amino acid substitution from SEQ ID NO:2, and the conservative amino acid substitution comprises (a) a replacement, one for another, among the aliphatic amino acids Ala, Val, Leu and Ile, (b) an interchange of the hydroxyl residues Ser and Thr, (c) an exchange of the acidic residues Asp and

Glu, (d) a substitution between the amide residues Asn and Gln, (e) an exchange of the basic residues Lys and Arg, (f) a replacement among the aromatic residues Phe, Tyr, or (g) any combination of a, b, c, d, e or f; or

(2) a nucleic acid comprising a sequence that is the complete complement of (1); wherein the nucleic acid is operably linked to a transcriptional control sequence, and the amino acid sequence of the phytase has at least 95% sequence identity to SEQ ID NO:2, wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 86 (new): A host cell comprising a vector comprising a nucleic acid

(1) (i) encoding a phytase comprising an amino acid sequence as set forth in SEQ ID NO:2; (ii) comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432; (iii) comprising an amino acid sequence as set forth in SEQ ID NO:2, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence; or (iv) comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence,

wherein the phytase sequence of (i), (ii), (iii) or (iv) has at least one conservative amino acid substitution from SEQ ID NO:2, and the conservative amino acid substitution comprises (a) a replacement, one for another, among the aliphatic amino acids Ala, Val, Leu and Ile, (b) an interchange of the hydroxyl residues Ser and Thr, (c) an exchange of the acidic residues Asp and Glu, (d) a substitution between the amide residues Asn and Gln, (e) an exchange of the basic residues Lys and Arg, (f) a replacement among the aromatic residues Phe, Tyr, or (g) any combination of a, b, c, d, e or f; or

(2) a nucleic acid comprising a sequence that is the complete complement of (1); wherein the nucleic acid is operably linked to a transcriptional control sequence, and the amino acid sequence of the phytase has at least 95% sequence identity to SEQ ID NO:2, wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 87 (new): A cell comprising an exogenous nucleic acid

(1) (i) encoding a phytase comprising an amino acid sequence as set forth in SEQ ID NO:2; (ii) comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432; (iii) comprising an amino acid sequence as set forth in SEQ ID NO:2, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence; or (iv) comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence,

wherein the phytase sequence of (i), (ii), (iii) or (iv) has at least one conservative amino acid substitution from SEQ ID NO:2, and the conservative amino acid substitution comprises (a) a replacement, one for another, among the aliphatic amino acids Ala, Val, Leu and Ile, (b) an interchange of the hydroxyl residues Ser and Thr, (c) an exchange of the acidic residues Asp and Glu, (d) a substitution between the amide residues Asn and Gln, (e) an exchange of the basic residues Lys and Arg, (f) a replacement among the aromatic residues Phe, Tyr, or (g) any combination of a, b, c, d, e or f; or

(2) a nucleic acid comprising a sequence that is the complete complement of (1);

wherein the nucleic acid is operably linked to a transcriptional control sequence, and the amino acid sequence of the phytase has at least 95% sequence identity to SEQ ID NO:2, wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 88 (new): A cell comprising

(1) an exogenous nucleic acid encoding an enzymatically active fragment of a phytase,

wherein the phytase comprises an amino acid sequence as set forth in (i) SEQ ID NO:2; (ii) residues 1 to 432 of SEQ ID NO:2; (iii) SEQ ID NO:2, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence; or (iv) SEQ ID NO:2 from amino acid residue 1 to 432, wherein the amino acid sequence

comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence,

wherein the phytase sequence of (i), (ii), (iii) or (iv) has at least one conservative amino acid substitution from SEQ ID NO:2, wherein the conservative amino acid substitution comprises (a) a replacement, one for another, among the aliphatic amino acids Ala, Val, Leu and Ile, (b) an interchange of the hydroxyl residues Ser and Thr, (c) an exchange of the acidic residues Asp and Glu, (d) a substitution between the amide residues Asn and Gln, (e) an exchange of the basic residues Lys and Arg, (f) a replacement among the aromatic residues Phe, Tyr, or (g) any combination of a, b, c, d, e or f; or

(2) a nucleic acid comprising a sequence that is the complete complement of (1); wherein the nucleic acid is operably linked to a transcriptional control sequence, and the amino acid sequence of the phytase has at least 95% sequence identity to SEQ ID NO:2, wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 89 (new): A method for glycosylating a polypeptide comprising:

a) providing a nucleic acid comprising a sequence encoding a polypeptide having phytase activity to a cell, wherein the sequence (i) comprises a nucleotide sequence as set forth in SEQ ID NO:1; (ii) comprises a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296, (iii) encodes a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence; (iv) encodes a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432, wherein the amino acid sequence comprises a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence; and

b) expressing the polypeptide in the cell wherein the cell is capable of glycosylating the polypeptide.

Claim 90 (new): The method of claim 89, wherein the cell is a yeast cell.

Claim 91 (new): The method of claim 89, wherein the heterologous amino acid sequence comprises a secretory signal sequence.

Claim 92 (new): An expression system comprising a nucleic acid:

- (i) comprising a nucleotide sequence as set forth in SEQ ID NO:1;
 - (ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296;
 - (iii) comprising the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence;
 - (iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2;
 - (v) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432;
 - (vi) encoding the polypeptide of (iv) or (v) further comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence;
 - (vii) comprising a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi);
 - (viii) comprising a nucleotide sequence as set forth in (i), (ii), or (iii) but lacking a leader sequence;
 - (ix) encoding a polypeptide comprising an amino acid sequence as set forth in (iv), (v) or (vi) but lacking a leader sequence;
 - (x) comprising a nucleotide sequence as set forth in (i), (ii), (iii) or (viii) and a heterologous nucleotide sequence imparting a desired characteristic; or
 - (xi) encoding a polypeptide comprising an amino acid sequence as set forth in (iv), (v), (vi) or (x) and a heterologous amino acid sequence imparting a desired characteristic,
- wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 93 (new): An isolated, synthetic or recombinant nucleic acid

- (i) comprising a nucleotide sequence as set forth in SEQ ID NO:1;
 - (ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296;
 - (iii) comprising the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence;
 - (iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2;
 - (v) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432;
 - (vi) encoding the polypeptide of (iv) or (v) further comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence;
 - (vii) comprising a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi);
 - (viii) comprising a nucleotide sequence as set forth in (i), (ii), or (iii) but lacking a leader sequence;
 - (ix) encoding a polypeptide comprising an amino acid sequence as set forth in (iv), (v) or (vi) but lacking a leader sequence;
 - (x) comprising a nucleotide sequence as set forth in (i), (ii), (iii) or (viii) and a heterologous nucleotide sequence imparting a desired characteristic; or
 - (xi) encoding a polypeptide comprising an amino acid sequence as set forth in (iv), (v), (vi) or (x) and a heterologous amino acid sequence imparting a desired characteristic,
- wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 94 (new): A method for glycosylating a polypeptide comprising:

- a) providing a nucleic acid comprising a sequence encoding a polypeptide having phytase activity to a cell, wherein the nucleic acid sequence
 - (i) comprises a nucleotide sequence as set forth in SEQ ID NO:1;

(ii) comprises a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296;

(iii) comprises the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence;

(iv) encodes a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2;

(v) encodes a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432;

(vi) encodes the polypeptide of (iv) or (v) further comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence;

(vii) comprises a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi);

(viii) comprises a nucleotide sequence as set forth in (i), (ii), or (iii) but lacking a leader sequence;

(ix) encodes a polypeptide comprising an amino acid sequence as set forth in (iv), (v) or (vi) but lacking a leader sequence;

(x) comprises a nucleotide sequence as set forth in (i), (ii), (iii) or (viii) and a heterologous nucleotide sequence imparting a desired characteristic; or

(xi) encodes a polypeptide comprising an amino acid sequence as set forth in (iv), (v), (vi) or (x) and a heterologous amino acid sequence imparting a desired characteristic,
wherein optionally the signal sequence comprises a secretory signal peptide.

b) expressing the polypeptide in the cell wherein the cell is capable of glycosylating the polypeptide.

Claim 95 (new): The method of claim 94, wherein the cell is a yeast cell.

Claim 96 (new): The method of claim 89 or claim 94, wherein the heterologous amino acid sequence imparting a desired characteristic comprises a secretory signal sequence.

Claim 97 (new): A transformed cell or a host cell comprising an exogenous nucleic acid

- (i) comprising a nucleotide sequence as set forth in SEQ ID NO:1;
- (ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296;
- (iii) comprising the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence;
- (iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2;
- (v) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432;
- (vi) encoding the polypeptide of (iv) or (v) further comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence;
- (vii) comprising a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi);
- (viii) comprising a nucleotide sequence as set forth in (i), (ii), or (iii) but lacking a leader sequence;
- (ix) encoding a polypeptide comprising an amino acid sequence as set forth in (iv), (v) or (vi) but lacking a leader sequence;
- (x) comprising a nucleotide sequence as set forth in (i), (ii), (iii) or (viii) and a heterologous nucleotide sequence imparting a desired characteristic; or
- (xi) encoding a polypeptide comprising an amino acid sequence as set forth in (iv), (v), (vi) or (x) and a heterologous amino acid sequence imparting a desired characteristic, wherein optionally the signal sequence comprises a secretory signal peptide.

Claim 98 (new): A vector comprising an exogenous nucleic acid

- (i) comprising a nucleotide sequence as set forth in SEQ ID NO:1;
- (ii) comprising a nucleotide sequence as set forth in SEQ ID NO:1 from nucleotide residue 1 to 1296;
- (iii) comprising the nucleotide sequence of (i) or (ii) further comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence;

(iv) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2;

(v) encoding a polypeptide comprising an amino acid sequence as set forth in SEQ ID NO:2 from amino acid residue 1 to 432;

(vi) encoding the polypeptide of (iv) or (v) further comprising a homologous signal sequence or a heterologous signal sequence in place of the homologous signal sequence;

(vii) comprising a sequence that is the complete complement of (i), (ii) or (iii) or the complete complement of the nucleic acid encoding the polypeptide of (iv), (v) or (vi);

(viii) comprising a nucleotide sequence as set forth in (i), (ii), or (iii) but lacking a leader sequence;

(ix) encoding a polypeptide comprising an amino acid sequence as set forth in (iv), (v) or (vi) but lacking a leader sequence;

(x) comprising a nucleotide sequence as set forth in (i), (ii), (iii) or (viii) and a heterologous nucleotide sequence imparting a desired characteristic; or

(xi) encoding a polypeptide comprising an amino acid sequence as set forth in (iv), (v), (vi) or (x) and a heterologous amino acid sequence imparting a desired characteristic,

wherein optionally the signal sequence comprises a secretory signal peptide.